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CARIDEAN SHRIMPS OBTAINED BY R.V. "SOELA" FROM NORTH-WEST AUSTRALIA, WITH DESCRIPTION OF A NEW SPECIES OF *LEPTOCHELA* (CRUSTACEA: DECAPODA: PASIPHAEIDAE)

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ABSTRACT

A small collection of caridean shrimps obtained by various benthic gears from north-west Australian shelf is reported. Among the 12 species, a new pasiphaeid shrimp is described under the name of *Leptochela (Proboloura) soelae.* This species is related to *L.(P.) carinata* Stimpson, but the distinction from the latter species is evidently made by having the fifth abdominal somite terminating in a long posterodorsal projection. All species have not been reliably reported before from the area.

KEYWORDS: Crustacea, Decapoda, Caridea, Pasiphaeidae, Oplophoridae, Thalassocarididae, North-West Australia.

INTRODUCTION

The caridean decapod crustacean fauna in the north-west Australian shelf has been little studied. Through the courtesy of Dr A.J. Bruce, Northern Territory Museum, Australia, interesting shrimp specimens collected by various benthic gears, on the recent cruises of the R.V. "Soela", Division of Fisheries, CSIRO, in north-west Australian waters were made available. In this paper, 12 species of caridean shrimp of the families Pasiphaeidae, Oplophoridae and Thalassocarididae are reported, of which one pasiphaeid shrimp is described as a new species.

The following abbreviations are used: NTM, Northern Territory Museum, Darwin; NSMT, National Science Museum, Tokyo; USNM, National Museum of Natural History, Smithsonian Institution, Washington DC; cl, carapace length, measured from orbital margin to posteromedian margin.

SYSTEMATICS

Family Pasiphaeidae
Genus *Pasiphaea* Savigny
Pasiphaea orientalis Schmitt
(Fig. 1)

Pasiphaea orientalis Schmitt, 1931: 267, Pl. 32, Figs 1,5; Burukovsky 1976: 20 (in key).

Material. CSIRO 0184-42, 1 ♀ cl 15.6 mm, (ovig.), 5 February 1984, 16°51.9′S, 119° 54.0′E, 499 m depth; CSIRO 0184-44, 1 ♂, cl ca. 18.6 mm, 2 ♀, cl 18.0, 20.3 mm (ovig. cl 20.3 mm), 5 February 1984, 16° 18.1′S, 120° 18.7′E, 498 m depth.

Description. Rostrum procurved, not extending beyond anterior margin of carapace. Branchiostegal spine extending beyond anterolateral margin of carapace. Carapace dorsally rounded, without carina or ridge. Abdomen dorsally rounded except sixth somite. Third and sixth abdominal somites ending in posterodorsal spine.

Telson dorsally grooved, apex nearly rounded, with four pairs of marginal spines and pair of subterminal spines.

First pereiopod with 7-13, and second pereiopod with 11-19 meral spines.

Remarks. *P. orientalis* is most similar to *P. semispinosa* Holthuis, 1951, but it differs from the latter by having posterodorsal spines on the third and sixth instead of fourth and sixth abdominal somites.

Distribution. Previously known only from Kaushiung (Takao), Taiwan. New to the Australian fauna.

Pasiphaea sinensis Hayashi and Miyake
(Fig. 2)

Pasiphaea sinensis Hayashi and Miyake, 1971: 39, Fig. 1; Toriyama and Hayashi 1982: 90, 92, 105 (in list).

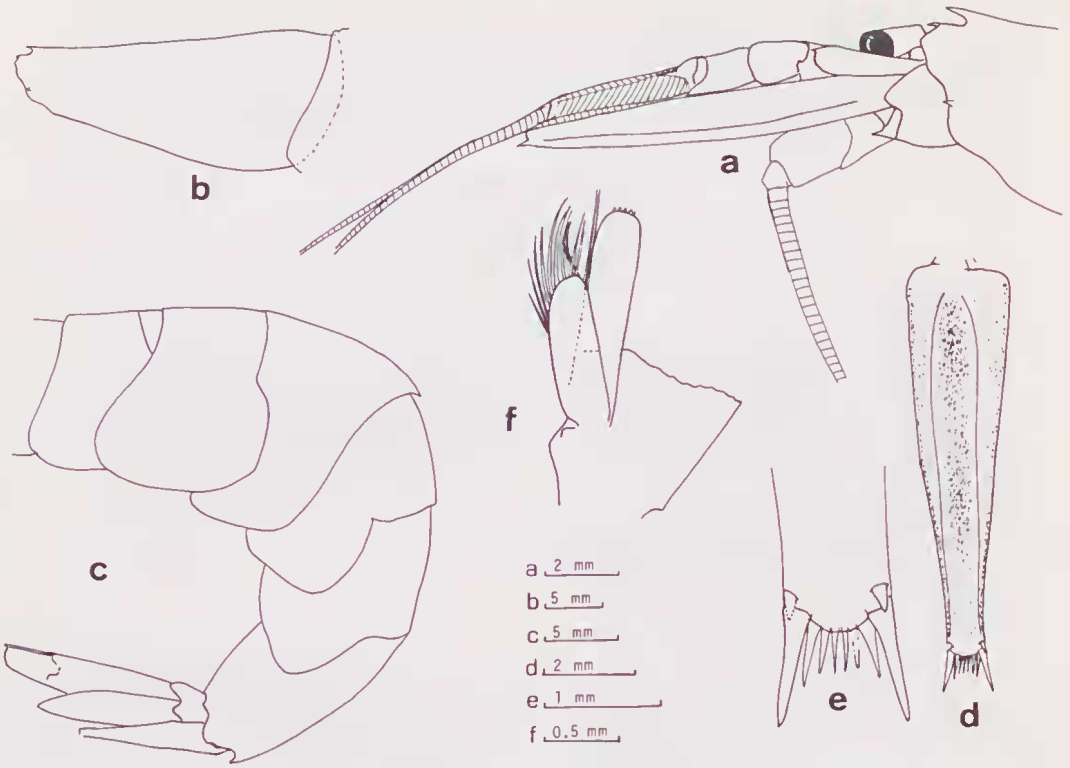

Fig. 1. *Pasiphaea orientalis* ♂ cl ca. 18.6 mm: **a**, anterior part of body, lateral; **b**, carapace, lateral; **c**, posterior part of body, lateral; **d**, telson; **e**, apex of telson; **f**, appendix masculina.

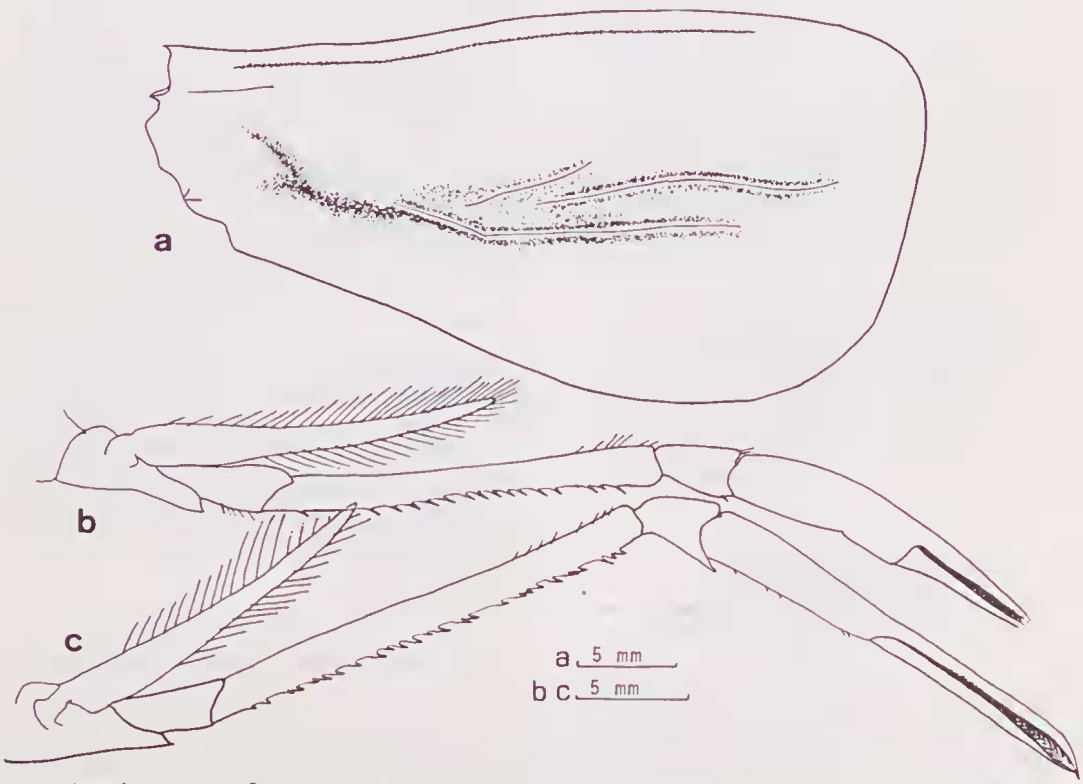

Fig. 2. *Pasiphaea sinensis* ♀ cl 35.1 mm: **a**, carapace, lateral; **b**, 1st pereiopod, right; **c**, 2nd pereiopod, right.

Material. CSIRO 0184-42, 1 ♀, cl 35.1 mm, 5 February 1984, 16°51.9′S, 119°54.0′E, 449 m depth.

Description. Carapace carinate along nearly whole length, with suprabranchial ridge and obtuse carina on gastrohepatic portion. Branchiostegal spine somewhat damaged in female at hand, but placed near anterolateral margin of carapace. Rostrum produced as forward extension of anterodorsal elevation of dorsal carina, with apical spine not reaching end of anterodorsal margin of carapace, anterior margin of rostrum slightly convex.

First abdominal somite without carina, but feebly ridged. Second to fifth somites with sharp dorsal carina. Sixth somite slightly carinate on anterior two-thirds, but on posterior third, with shallow longitudinal groove on lateral surface.

Telson as long as sixth somite, dorsally grooved, apex forked, with posterior sinus shallow, possibly damaged, and armed with seven pairs of fragile marginal spines.

First and second pereiopods with 16 and 26 meral spines, respectively.

Remarks. In the genus *Pasiphaea*, the following four of some 35 species are characterized by having the carapace and abdomen carinate, the telson with a forked apex, and the basis of the second perciopod unarmed except for the terminal spine: *P. acutifrons* Bate, 1888, *P. pacifica* Rathbun, 1902, *P. barnardi* Yaldwyn, 1971, and *P. sinensis* Hayashi and Miyake, 1971. The number of spines on the meri of the first two pereiopods varies in each species, but it may have taxonomic importance, as shown on Table 1.

The present material agrees well with the description of *P. sinensis*. But the ratio of palmar length to fingers, especially in the second pereiopod, is smaller than the value given for *P. sinensis* by the original authors, being about 0.83 times as long as the fingers, instead of 1.23 times. As the "Soela" specimen is much smaller than the type specimens of *P. sinensis*, the disparity is probably due to the difference in body size.

In adult stage, *P. emarginata* Rathbun, 1902, has the carapace and abdomen carinate and the telson weakly emarginate at apex, but not forked as in the *P. acutifrons* species group. The spination of the meri of the first and second perciopods in *P. emarginata* has not been described in literature with certitude. Dr F.A. Chace has kindly informed me that, as yet unpublished review by Dr Yaldwyn, the ovigerous female holotype of that species has six meral spines on the first pereiopod and 14 on the second (Chace, pers. comm.). The rostral shape of *P. emarginata*, however, is noticeably different from that of *P. sinensis*.

Distribution. Previously known from the East China Sea and Tosa Bay, Japan. New to the Australian fauna.

Genus *Leptochela* Stimpson key to north-west Australian species

1. Sixth abdominal somite with movable lappet, fifth somite dorsally uneven, with prominent elevations and posterodorsal spine ..... *soelae*

   Sixth abdominal somite without movable lappet 2
2. Fifth abdominal somite with distinct dorsal elevations ..... *japonica*

   Fifth abdominal somite without dorsal elevation 3
3. Telson with one pair of dorsomesial and two pairs of dorsolateral spines 4

   Telson with one pair of dorsomesial and one pair of dorsolateral spines 5
4. Rostrum relatively short, not reaching end of cornea, appendix masculina distinctly overreaching appendix interna ..... *robusta*

   Rostrum relatively long, often overreaching end of cornea, appendix masculina

Table 1. Number of meral spines on the first and second pereiopods in four *Pasiphaea* species.

Species	*Pp1*	*Pp2*	*Sources*
P. acutifrons	4-6	8-11	Holthuis (1952)
P. pacifica	0-4	8-11	Rathbun (1902, 1904); Butler (1980)
P. barnardi	1-3	12-13	Yaldwyn (1971)
P. sinensis	6-22	19-27	Hayashi and Miyake (1971)

reaching as far as end of appendix interna ..... (irrobusta)

5. Suborbital angle with spine ... (pugnax)
   Suborbital angle without spine .... *aculeocaudata*?

Leptochela (Leptochela) aculeocaudata? Paulson
(Fig. 3)

Leptochela aculeocaudata Paulson, 1875: 100, Pl. 16, Fig. 1-1s (translation, 1961: 106, Pl. 16, Fig. 1-1s); Gurney 1939: 428, 429, 433.

Leptochela aculeocaudata hainanensis - Armstrong 1941: 1.

Leptochela (Leptochela) aculeocaudata - Chace 1976: 4, Figs 2-4.

Material. CSIRO 0283, 1 ♀, cl 2.6 mm (definite data unknown).

Description. Distal part of rostrum broken off, rest of rostrum relatively high. Carapace with three longitudinal dorsal carinae along nearly whole length of carapace. Orbital margin entire, without serrated spines. Suborbital angle rounded, without spine.

Fifth abdominal somite dorsally rounded. Sixth somite nearly twice as long as high.

Telson nearly 1.5 times as long as sixth somite, slightly more than 3.0 times as long as wide, bearing pair of dorsomesial and pair of dorsolateral spines in addition to usual five pairs of distal spines, without minute distomesial pair of spines.

Eye with cornea nearly as long as width of stalk, ocular tubercle low and small.

Antennal scale about 0.4 times as long as carapace, and about 3.0 times as long as wide, lateral margin concave.

First pereiopod overreaching antennal scale by more than length of fingers, armed with at least 18 spines on opposable margin of dactylus.

Remarks. *L. (L.) aculeocaudata* is so closely related to *L. (L.) sydniensis* Dakin and Colefax that these two species have often been confused (cf. Chace 1976).

The present female specimen appears to be closely related to *L. (L.) aculeocaudata* but differs slightly from the typical form shown by Chace (1976) in some external features.

In my specimen the basal segment of the antennal peduncular segment is not entirely concealed by the carapace. A similar form was observed by Chace in material from the Samoa Islands reported by Armstrong (1941), but the former author believed this to be an artifact resulting from faulty preservation. However, I cannot abandon the assumption that the failure of the carapace to conceal the basal segment of second antenna may be rather frequently observed among individuals of *L. (L.) aculeocaudata*.

The pair of dorsolateral ridges on the carapace does not conceal the median ridge,

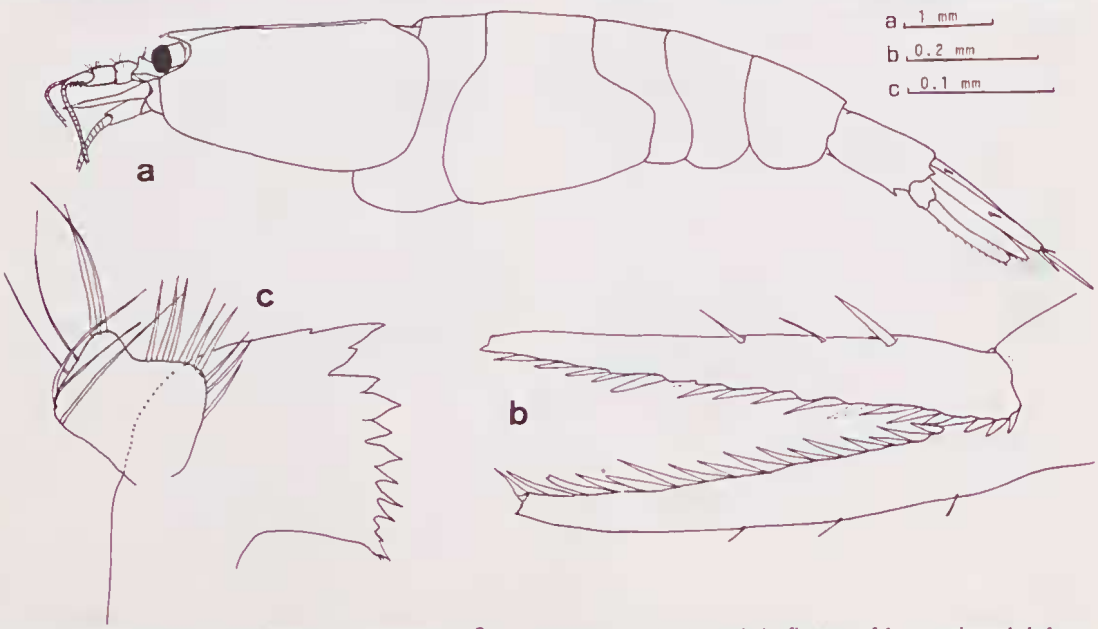

Fig. 3. *Leptochela (Leptochela) aculeocaudata*? ♀cl 2.6 mm: **a**, body, lateral; **b**, fingers of 1st pereiopod, left; **c**, mandible, left.

though the former pair is higher than it is in the material ascribed to *L. (L.) sydniensis* from the northern part of the Sea of Japan.

The fingers of the present specimen are more or less broken off, and the exact number of spines on the dactylus is uncertain. If the finger to palm ratio of 1.8-2.0, which Chace noted for *L. (L.) aculeocaudata* (this is also useful for *L. (L.) sydniensis)*, is adapted to the present case, about 20-22 spines on the opposable margin of the dactylus of the first pereiopod is quite reasonably supposed.

The specimen is assumed to be adult by the pleura of the first and second abdominal somites are obviously enlarged and somewhat fragile, a condition usually seen in breeding females. I suppose, therefore, that this female was either nearly in breeding condition or had just released its eggs. If my assumption is correct, the size of female is much smaller than the size range known for adult *L. (L.) sydniensis*, but falls within that of *L. (L.) aculeocaudata*.

The identification is tentative, even if I am inclined to believe that the material is identifiable with *L. (L.) aculeocaudata*.

Distribution. Reliable records of the species are: Red Sea; Samoa Islands. Previously reported in Australia from Queensland.

Leptochela (Leptochela) japonica Hayashi and Miyake

(Fig. 4)

Leptochela japonica Hayashi and Miyake, 1969b: 1, Figs 1,2; Fujino and Miyake 1970: 242.

Leptochela (Leptochela) japonica-Chace 1976: 23, Figs 19-21.

Material. CSIRO 0283, 2 ♀, cl 4.6, 4.9 mm (definite data unknown); CSIRO 0283, 2 ♀, cl 4.6, 5.0 mm (definite data unknown); CSIRO 0283-121, 1 ♀, cl 5.0 mm (ovig.), 28 April 1983, 19°03.5′S, 119°03.6′E, 80 m depth; CSIRO 0283-129, 1 ♀, cl 4.3 mm (ovig.), 28 April 1983, 19°05.0′S, 118°57.5′E, 82 m depth.

Description. Rostrum with dorsal margin nearly straight, or slightly concave. Carapace with three longitudinal dorsal ridges, lateral pair distinctly carinate in breeding females, somewhat obscure in non-breeding females. Orbital margin smooth, not serrate, and no mesially directed spine on ventral portion. Suborbital angle without spines.

Fourth abdominal somite with three dorsal elevations, slightly increasing in height post-

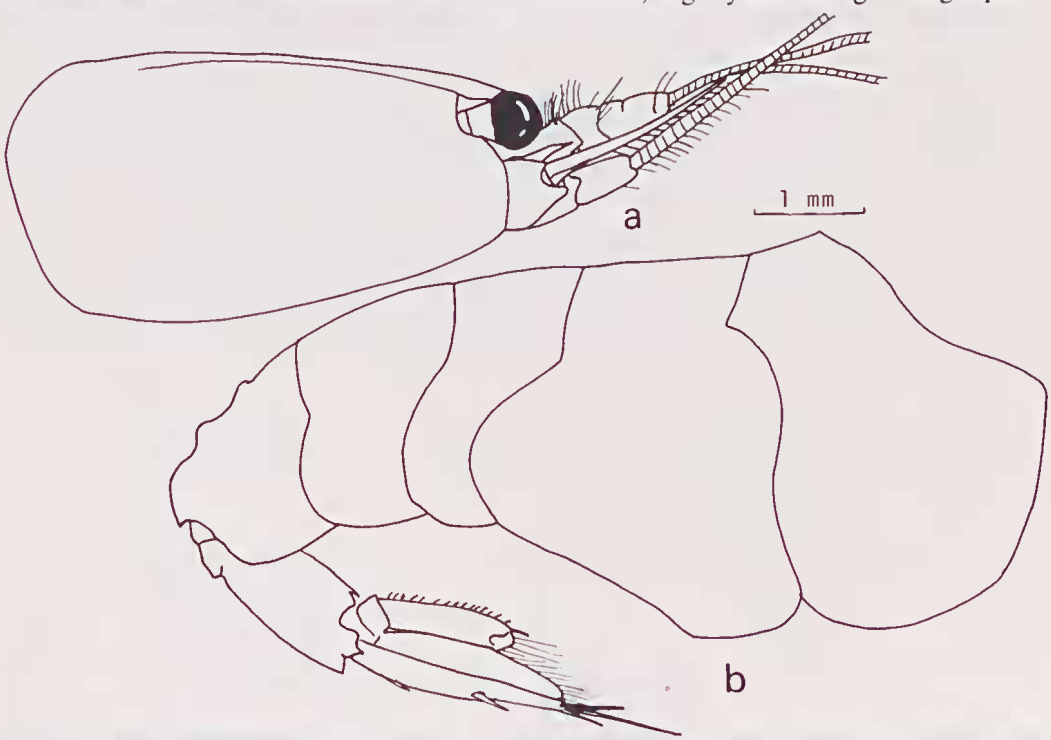

Fig. 4. *Leptochela (Leptochela) japonica* ♀ (ovig.) cl 4.3 mm: **a**, anterior part of body, lateral; **b**, posterior part of body, lateral.

eriorly, and blunt posterodorsal projection. Sixth somite without dorsal movable lappet.

Telson with pair of dorsomesial and pair of dorsolateral spines in addition to usual five pairs of posterior marginal spines.

Antennal scale 0.50-0.58 times as long as carapace.

Distribution. Gulf of Thailand; southern Japan. Previously known in Australia from Queensland.

Leptochela (Leptochela) robusta Stimpson
(Fig. 5)

Leptochela robusta Stimpson, 1860: 43; de Man 1916: 148 (in part); - 1920: 20 (in part), pls 3, 4, Fig. 7-7w.

Leptochela (Leptochela) robusta- Chace 1976: 34, Fig. 28.

Material. CSIRO 0283 2 ♂, cl 3.0, 3.3 mm, 1 ♀, cl 4.0 mm (definite data unknown); CSIRO 0283, 2 ♂, cl 2.7, 4.0 mm, 4 ♀, cl 3.0-5.0 mm (definite data unknown); CSIRO 0283-104, 1 ♂, cl, 5.2 mm, 1 ♀, cl 4.9 mm (ovig.), 27 April 1983, 19°05.3′S, 118°53.8′E, 80 m depth; CSIRO 0283-121, 1 ♂, cl 5.1 mm, 28 April 1983, 19°03.5′S, 119°03.6′E, 80 m depth; CSIRO 0283-129, 1 ♂, cl ca 5.5 mm, 28 April 1983, 19°05.0′S, 118°57.5′E, 82 m depth; CSIRO 0283-132, 1 ♀, cl 4.9 mm (ovig.), 28 April 1983, 19°04.4′S, 118°47.3′S, 82 m depth.

Description. Rostrum short, usually not reaching end of cornea. Carapace with three longitudinal dorsal ridges in breeding females, nearly rounded dorsally in males and non-breeding females. Orbital margin smooth, not serrate, armed with mesially directed tooth or projection on ventral portion. Suborbital angle rounded, without spine.

Fifth abdominal somite without carination or ridge. Sixth somite without movable dorsal lappet.

Telson with pair of dorsomesial and two pairs of dorsolateral spines in addition to usual five pairs of posterior marginal spines, no minute mesial spines on distal margin.

Antennal scale 0.53-0.65 (mean: 0.60) times as long as carapace, 2.8-3.2 (mean: 2.96) times as long as wide.

Appendix masculina distinctly overreaching appendix interna.

Remarks. This species is closely related to *L. (L.) irrobusta* Chace so that early records of this species may have been confused with the latter. In the present material, the rostrum is relatively short, and the appendix masculina distinctly overreaches the appendix interna. These characters make the identification clear.

The present study revealed that females of *L. (L.) robusta* could become mature when they reach at least 4.9 mm in carapace length. This value is much smaller than that suggested by Chace (1976).

Kensley (1969, 1981b) recorded *L. (L.) robusta* from South African waters. This record is far removed from the known range of this species (see Chace 1976). As the author did not describe or figure his material, it is therefore uncertain, at the present time, whether either *L. (L.) robusta* or *L. (L.) irrobusta* lives in South African waters. However the latter species is known to be widely distributed in the Indo-West Pacific region (cf. Chace 1976).

Distribution. Reliable records are: South China Sea; Philippine Islands; Indonesia. First record of occurrence in Australia with reasonable certitude.

Fig. 5. *Leptochela (Leptochela) robusta:* **a-b**, ♀ (ovig.) cl 4.9 mm: **a**, anterior part of body, lateral; **b**, posterior part of body, lateral; **c**, ♂ cl 5.1 mm, appendix masculina.

Leptochela (Proboloura) soelae sp. nov.

(Figs 6-8)

Type material. HOLOTYPE - ♀, NTM Cr. 003605, cl 8.6 mm, CSIRO 0283-122, 28 April 1983, 19°05.0'S, 118°53.8'E, 82 m depth; PARATYPES - 1 ♂, NTM Cr. 003606, cl 5.9 mm, CSIRO 0283-137, 28 April 1983, 19°03.5'S, 119°03.1'E, 82 m depth; 1 juv. NTM Cr. 003607, cl 4.1 mm, CSIRO 0283 Fish larvae Stn 7(1), 18°.45'S, 119°05'E (date unknown); 1 ♀ (ovig.), NSMT Cr-9205, cl 9.1 mm, CSIRO 0283-85, 27 April 1983, 19°05.4'S, 118°53.5'E, 80 m depth; 1 ♂, NSMT Cr-9206, cl 6.0 mm, CSIRO 0283-129, 28 April 1983, 19°05.0'S, 118°57.5'E, 82 m depth; 1 ♀, cl 7.1 mm, CSIRO 0283-121, 28 April 1983, 19°03.5'S, 119°03.6'E, 80 m depth (USNM 233802).

Diagnosis. Carapace with three longitudinal dorsal carinae in both males and females. Orbital margin entire, not serrate, with mesially directed tooth at lower portion. Rostrum long, nearly reaching end of antennular peduncle, dorsal margin slightly concave. Fifth abdominal somite with three dorsal projections and prominent posterodorsal tooth. Sixth abdominal somite with movable lappet, basally wide and distally narrow. Telson with pair of dorsomesial and two pairs of dorsolateral spines in addition to usual five pairs of distal spines. Antennal scale 0.5-0.6 times as long as carapace.

Description. Body moderately stout. Rostrum nearly or quite reaching as far as end of antennular peduncle segment, dorsal margin concave.

Carapace dorsally tricarinate over most of carapace length in males and females, lateral pair beginning just behind orbital margin and disappearing just before posterior margin. Orbital margin smooth, not serrate, but with small, mesially directed tooth on lower margin. Suborbital angle rounded, without spine.

Abdominal terga dorsally rounded on anterior three somites. Fourth somite also dorsally rounded, but rarely on posterior half, and posterodorsal portion with deep rift. Pleuron of first somite with 4-6 spines on lower margin, except in ovigerous female. Fifth somite with three prominent dorsal elevations and sharp posterior projection, latter nearly reaching base of lappet. Sixth somite about 2.2 times as long as high, and provided with movable lappet on dorsal margin, elliptical in shape, basally wide and distally narrow; ventrolateral margin with acute tooth.

Telson 2.1-2.3 times as long as sixth somite and 2.5-2.8 times as long as wide, dorsal margin deeply grooved, bearing pair of dorsomesial and two pairs of dorsolateral spines, anterior pair of latter spines placed nearly in line of dorosomesial spines and posterior pair at distal third, distal margin armed with usual five pairs of spines only. Exopod of uropod shorter than endopod, with a series of spines on outer margin. Endopod of uropod slightly shorter than telson, with stout spines on distal fourth of outer margin.

Eye with cornea wider than stalk, with distinct ocular tubercle on distal inner margin of stalk.

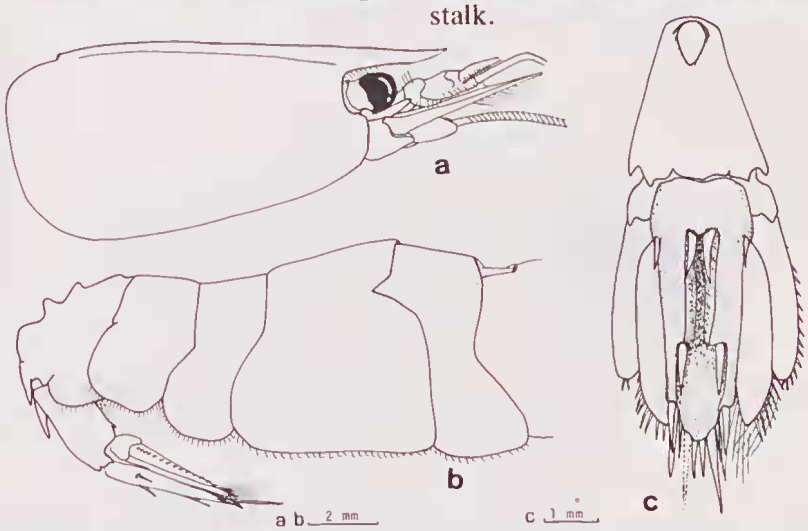

Fig. 6. *Leptochela (Proboloura) soelae* holotype, ♀ cl 8.6 mm: **a**, anterior part of body, lateral; **b**, posterior part of body, lateral; **c**, telson.

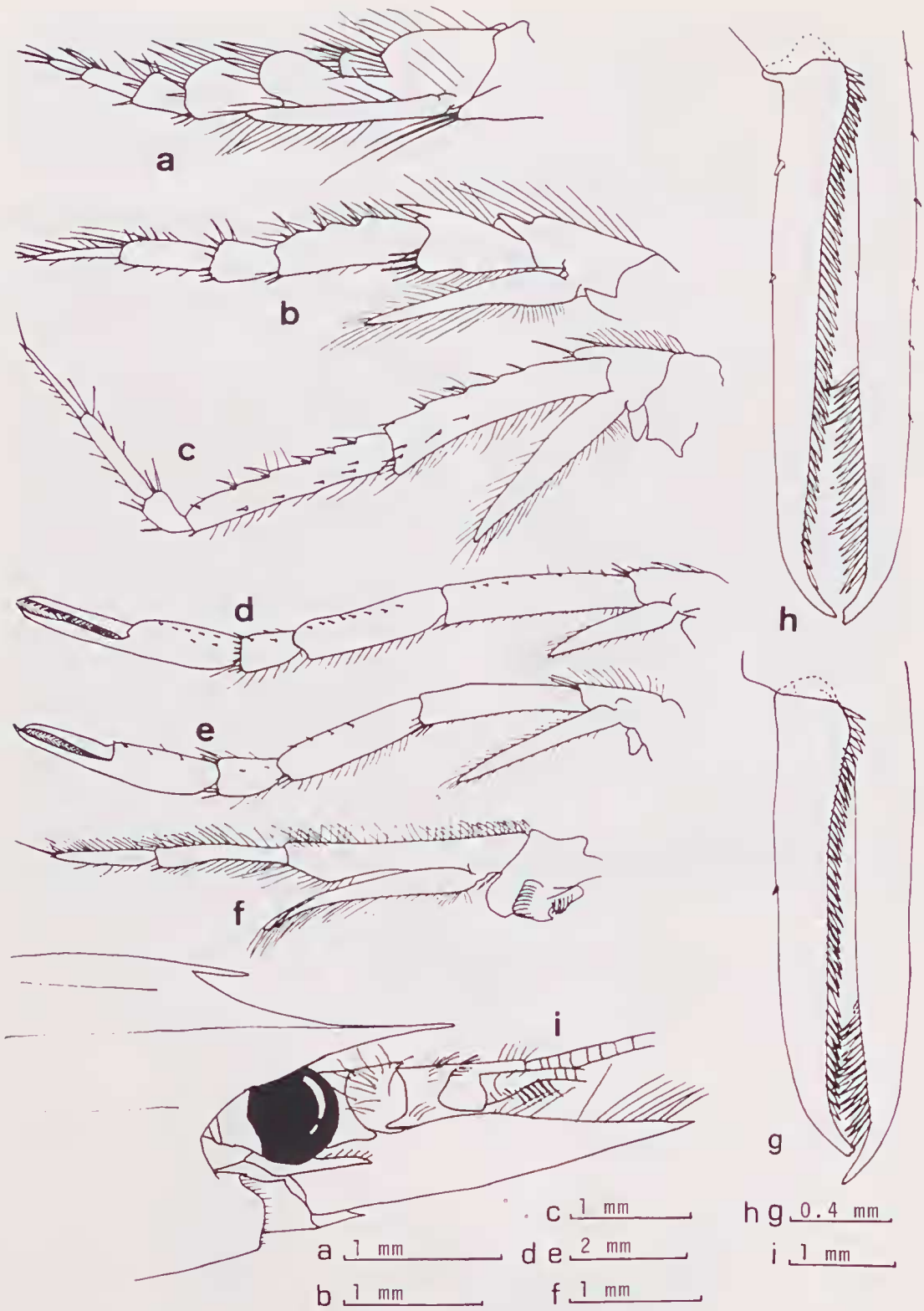

Fig. 7. *Leptochela (Proboloura) soelae* holotype, ♀ cl 8.6 mm: **a**, 5th pereiopod, right; **b**, 4th pereiopod, right; **c**, 3rd pereiopod, right; **d**, 2nd pereiopod, right; **e**, 1st pereiopod, right; **f**, 3rd maxilliped, right; **g**, fingers of 1st pereiopod, right; **h**, fingers of 2nd pereiopod, right; **i**, anterior part of bodys oblique.

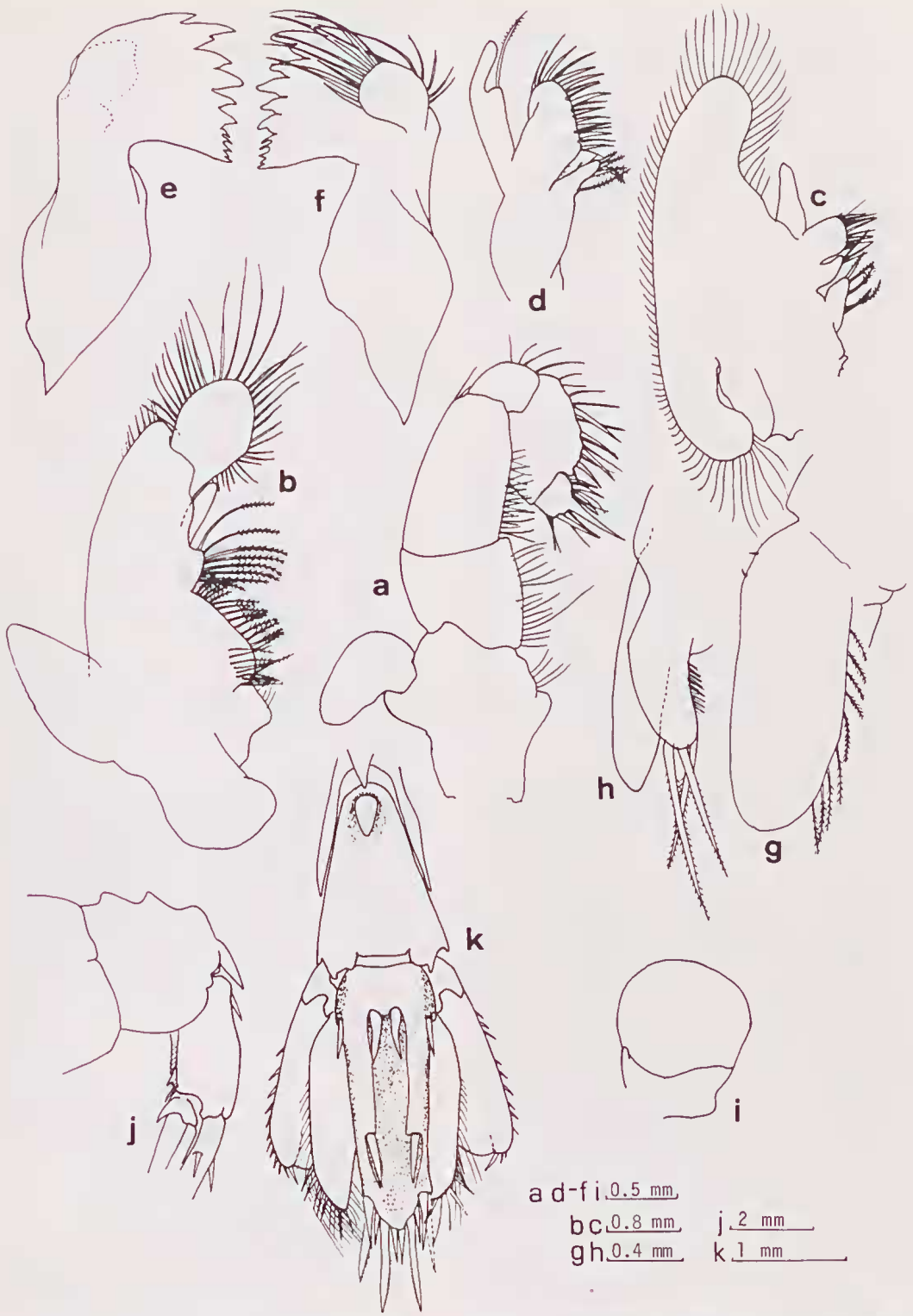

Fig. 8. *Leptochela (Proboloura) soelae:* **a-f,** holotype, ♀ cl 8.6 mm: **a**, 2nd maxilliped, right; **b**, 1st maxilliped, right; **c**, 2nd maxilla, right; **d**, 1st maxilla, right; **e**, mandible, right (ventral view); **f**, same (dorsal view); **g-i**, paratype, ♂ cl 6.0 mm: **g**, endopod of 1st pleopod, right; **h**, appendix masculina, right; **i**, eye, right; **j-k**, paratype, ♀ (ovig.) cl 9.1 mm: **j**, 5th and 6th abdominal somites, lateral; **k**, 6th abdominal somite and telson.

Antennular peduncle with stylocerite overreaching first segment.

Antennal scale 0.5-0.6 times as long as carapace and 3.8-4.0 times as long as wide, outer margin usually convex or nearly straight, inner margin slightly concave near midlength, with distinct outer spine and distal margin of blade usually indistinct, rarely forming shallow sinus. Distal segment of antennal peduncle about half as wide as antennal scale, and reaching nearly two-fifths of scale.

Mouth parts as follows: mandible with 12 teeth on cutting edge in right half, palp short, nearly rounded; first maxilla as in genus, with lower endite narrow and slender, palp with long seta on midportion; second maxilla with upper endite deeply cleft near posterior third, lower endite narrow, with several setae, palp without setae, scaphognite developed; first maxilliped with exopod fully developed, and divided into two parts, distal part small and bearing long plumose setae, epipod long, endopod divided into two segments; second maxilliped with long epipod, nearly leaf-shaped, no exopod present, distal segment terminating in strong spine.

Third maxilliped extending nearly to distal third of antennal scale, or nearly to level of end of antennular peduncle.

First pereiopod overreaching antennal scale by more than half length of fingers, fingers 1.0-1.1 times as long as palm and bearing 32-48 spines on opposable margin of dactylus. Second pereiopod overreaching antennal scale by about length of fingers (only two-fifths in left appendages in holotype), dactylus 1.0-1.1 times as long as palm and bearing 46 spines on opposable margin of dactylus (only one specimen is available). Third pereiopod reaching as far as anterolateral margin of carapace; ischium with four or five spines on flexor margin and three or four spines on exterior margin; merus with six or seven spines on flexor margin and four or five spines on exterior margin; dactylus about 0.9 times as long as propodus. Fourth pereiopod overreaching end of ischium of third pereiopod by half to one-third length of dactylus; dactylus 0.87-0.91 as long as propodus; exopod reaching to midlength of merus. Fifth pereiopod overreaching Ischium of fourth pereiopod by length of dactylus and half or more length of propodus; coxa with oblong exterior projection bearing stout spines on distal margin; dactylus shorter than propodus, about 0.7 times as long as latter leg; exopod overreaching end of ischium.

Remarks. The genus *Leptochela* is divided into two subgenera, *Leptochela* and *Ploboloura*, the latter of which has been represented by *L. (P.) carinata* Ortmann, 1893, from the Atlantic Ocean. The new species differs strikingly from the Atlantic species by having a prominent posterodorsal projection on the fifth abdominal somite. Other remarkable features distinguishing the present species from the latter are as follows: 1) the rostrum is long, nearly reaching the end of the second antennular peduncle, instead of not overreaching the cornea; 2) the carapace has three longitudinal ridges both in males and females, instead of such condition in ovigerous females only; 3) the antennal scale is short, about half the length of the carapace, instead of relatively long, about three-fourths or more as long as the carapace; 4) the movable lappet on sixth abdominal somite is nearly ovate, basally wide and distally narrow, instead of subtriangular-shaped, basally narrow and distally wide; 5) the size of mature individuals is greater, attaining 9.1 mm in carapace length (ovigerous female), instead of 7.7 mm in the largest recorded female of *L. (P.) carinata*.

This species is also similar to *L. (L.) japonica* Hayashi and Miyake in the dorsal carination of the fifth abdominal somite, but it is distinguishable from the latter by the prominent posterodorsal projection on the fifth abdominal somite, the presence of movable lappet on the sixth somite and by arrangement of the spines on the telson.

The name "soelae" is derived from the R.V. "Soela".

Distribution. Known only from north-west Australian shelf.

Family Oplophoridae
Genus *Acanthephyra* A. Milne Edwards
Acanthephyra smithi Kemp
(Fig. 9a, b)

Acanthephyra smithi Kemp, 1939: 577; Hayashi and Miyake 1969a: 61, Fig. 2; Aizawa 1974: 32; Ziemann 1975: 30; Chace 1986: 31, Figs 3k, 4w, 5w, 7j, 10f.

Material. CSIRO 0184-92, 1 ♀, cl 16.8 mm, 18 February 1984, 16°08.5′S, 120°09.4′E, 598 m depth.

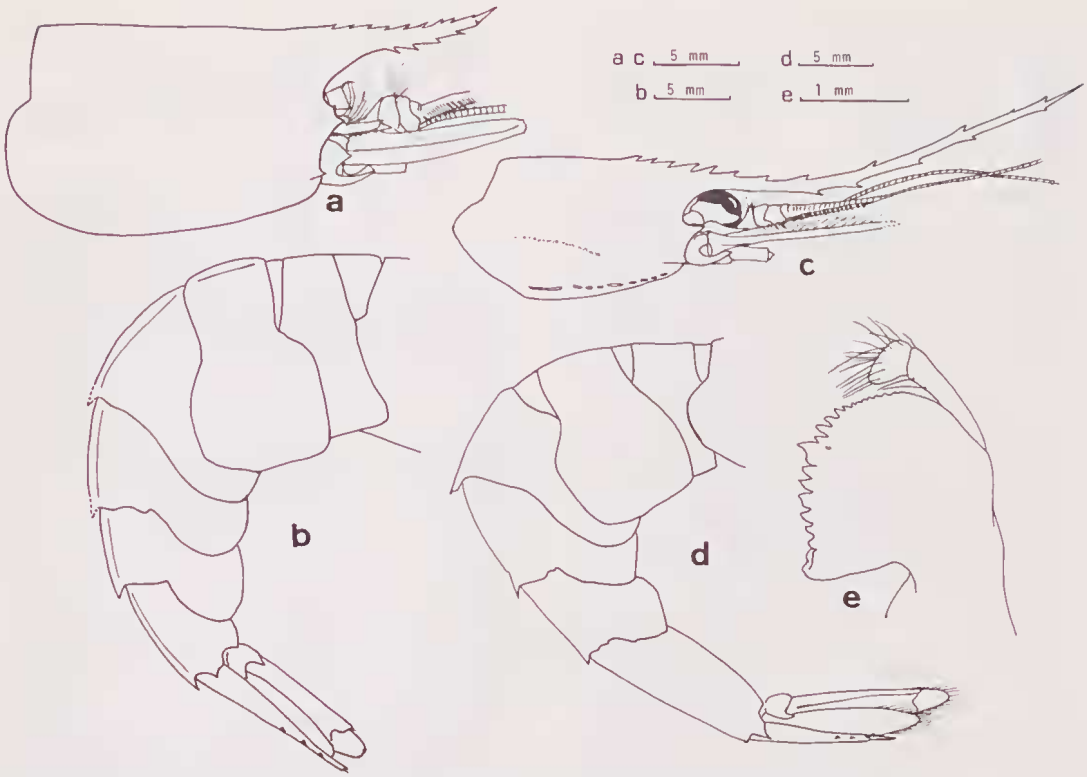

Fig. 9. *Acanthephyra smithi* ♀ cl 16.8 mm: **a**, anterior part of body, lateral; **b**, posterior part of body, lateral. *Systellaspis pellucida* ♀ cl 11.4 mm: **c**, anterior part of body, lateral; **d**, posterior part of body, lateral; **e**, mandible, left.

Description. Carapace without dorsal carina. Rostrum shorter than carapace, armed with nine dorsal and five ventral spines throughout its length. Branchiostegal spine supported by very short carina.

Abdomen with relatively high carinae on second to sixth somites, and armed with posterodorsal spines on third to sixth somites (some of them are broken off in this specimen).

Telson grooved dorsally, apex broken off, but rest armed with three pairs of dorsolateral spines.

Distribution. Tropical and subtropical regions of Indo-West Pacific. Not previously reported in the north-west Australia.

Genus *Systellaspis* Bate
Systellaspis pellucida (Filhol)
(Fig. 9c-e)

Acanthephyra pellucida Filhol, 1884:199; Figueira 1957: 33 (in text); Holthuis 1980: 188.

Acanthephyra affinis Faxon, 1896: 162, Pl. 2, Figs 1-3.

Systellaspis lanceocaudata- (not Bate) Balss 1925: 243, Figs 12, 13.

Systellaspis affinis- Chace 1947: 39, Fig. 3; Crosnier and Forest 1968: 1133.

Systellaspis pellucida- Crosnier and Firest 1973: 92, Figs 26c, 27c; Chace 1986: 67, Figs 34m- o, 35g, h.

Material. CSIRO 0184-32, 1 ♂, cl -mm, 1 ♀, cl 12.1 mm, 3 February 1984, 17°35.2′S, 118°42.0′E, 450 m depth; CSIRO 0184-51, 2 ♀, cl 11.4, 13.2 mm, 10 February 1984, 15°41.5′S, 120°35.9′E, 502 m depth; CSIRO 0184-70, 2 ♂, cl 8.4, 8.6 mm, 7 ♀, cl 8.9-12.1 mm, 13 February 1984, 13°43, 1′S, 122°14.0′E, 495 m depth; CSIRO 0184 NWS-58 T/34, 1 ♂, cl 11.8 mm, 3 February 1984, 17°16.3′S, 119°01.5′E, 456-460 m depth (NTM Cr. 000681).

Description. Body moderately slender. Rostrum slender, distinctly longer than carapace, bearing 10-12 dorsal and 5-7 ventral spines. Branchiostegal spine supported by short, but high carina. No longitudinal carina or ridge on lateral surface of carapace.

Abdomen with dorsal carina on third and fourth somites.

Pleuron of fifth somite usually with a shallow notch on posterolateral margin. Sixth

somite rounded dorsally, without groove. Telson shorter than endopod of uropod, armed with three pairs of dorsolateral spines, sharp pointed end-piece bearing about four pairs of lateral spines.

Remarks. Crosnier and Forest (1973) reasonably suggested that the material recorded by Balss (1925) as *S. lanceocaudata* from the Zanzibar area would be probably identifiable with this species. The mandible of Balss's specimen, as figured by him, differs slightly from that of *S. pellucida* in the present series in the number of teeth on cutting edge, but agrees with that of *S. lanceocaudata* taken from Suruga Bay, Japan (Tokai University, IORDIN 79-89; - 115; - 123; - 126). *S. pellucida* usually has 19 and 14 teeth respectively on left and right mandibles, instead of 21 and 15 teeth as in *S. lanceocaudata*, though I have not been able to check the variation, if any, among individuals of both species.

The rostrum of *S. lanceocaudata*, however, has 16-19 dorsal and 7-10 ventral spines. The number shown by Balss appears to be small for *S. lanceocaudata*.

The pleuron of the fifth somite figured by Balss is, as pointed out by Crosnier and Forest, agreeable with *S. pellucida*. Thus, Balss's material is, despite the slight disagreement in the mandible, quite similar to this species. I think it is highly probable that the number of teeth of the mandible was figured somewhat inaccurately.

A full synonymy may be found in Crosnier and Forest (1973), and Holthuis (1980).

Distribution. South China Sea; Philippines; Malay Archipelago; Zanzibar; coasts along west Africa; West Indies; Bahamas; Gulf of Mexico. New to north-west Australian shelf fauna.

Genus *Janicella* Chace
Janicella spinicauda (A. Milne Edwards)
(Figs 10, 11)

Oplophorus spinicauda A. Milne Edwards, 1883, Pl. 30; Chace 1936: 30; -1940: 184, Fig. 54; Springer and Bullis 1956: 11; Bullis and Thompson 1965: 7; Hayashi and Miyake 1969a: 68; Kensley 1969: 169, Fig. 11; - 1972: 38, Fig. 17d, e; -1977: 19 (in list); - 198la: 58 (in list); -1981b: 22; Wasmer 1972: 83; Aizawa 1974: 36; Ziemann 1975: 58; Hanamura 1979: 171.

Oplophorus foliaceus Rathbun, 1906: 922, Pl. 20, Fig. 8.

Hoplophorus foliaceus-Kemp 1913: 64; de Man 1920: 48 (in key); Balss 1925: 249.

Hoplophorus spinicauda- de Man 1920:48 (in key).

Acanthephyra anomala Boone, 1927:104, Fig. 21.

Janicella spinicauda-Chace 1986:44, Figs 23,24.

Material. CSIRO 0184-76, 1 ♂, cl 11.3 mm, 14 February 1984, 13°42.6′S, 122°57.9′E, 349 m depth.

Description. Rostrum slender, longer than carapace, with 12 dorsal and seven ventral spines. Carapace with dorsal carina. Branchiostegal spine small, projecting from just behind anterolateral margin, no carina supporting spine.

Abdomen with posterodorsal spines on second to fourth somites.

Telson broken off at tip.

Antennal scale slightly shorter than carapace, armed with three lateral spines. Basicerite with shorter ventrolateral process, not greatly long.

Exopods on second and third maxillipeds and on first pereiopod not so rigid as in genus *Oplophorus*.

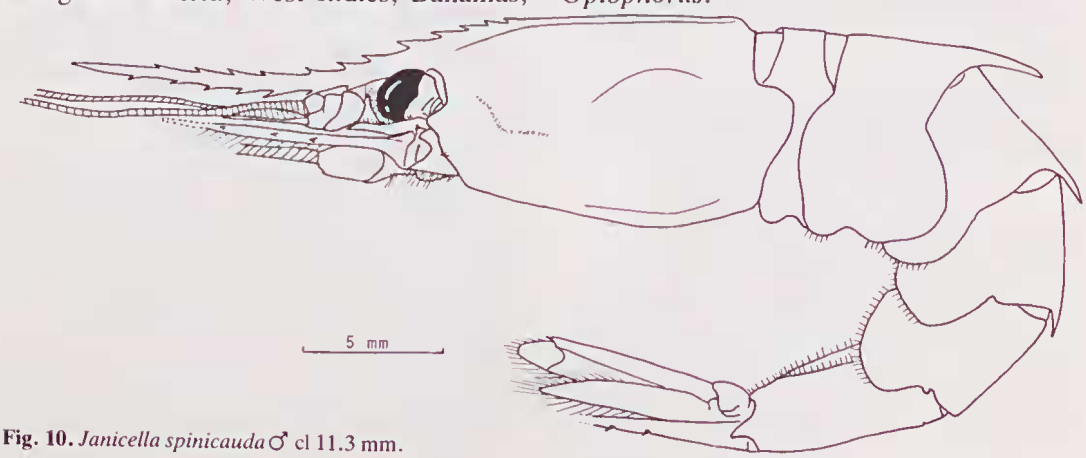

Fig. 10. *Janicella spinicauda* ♂ cl 11.3 mm.

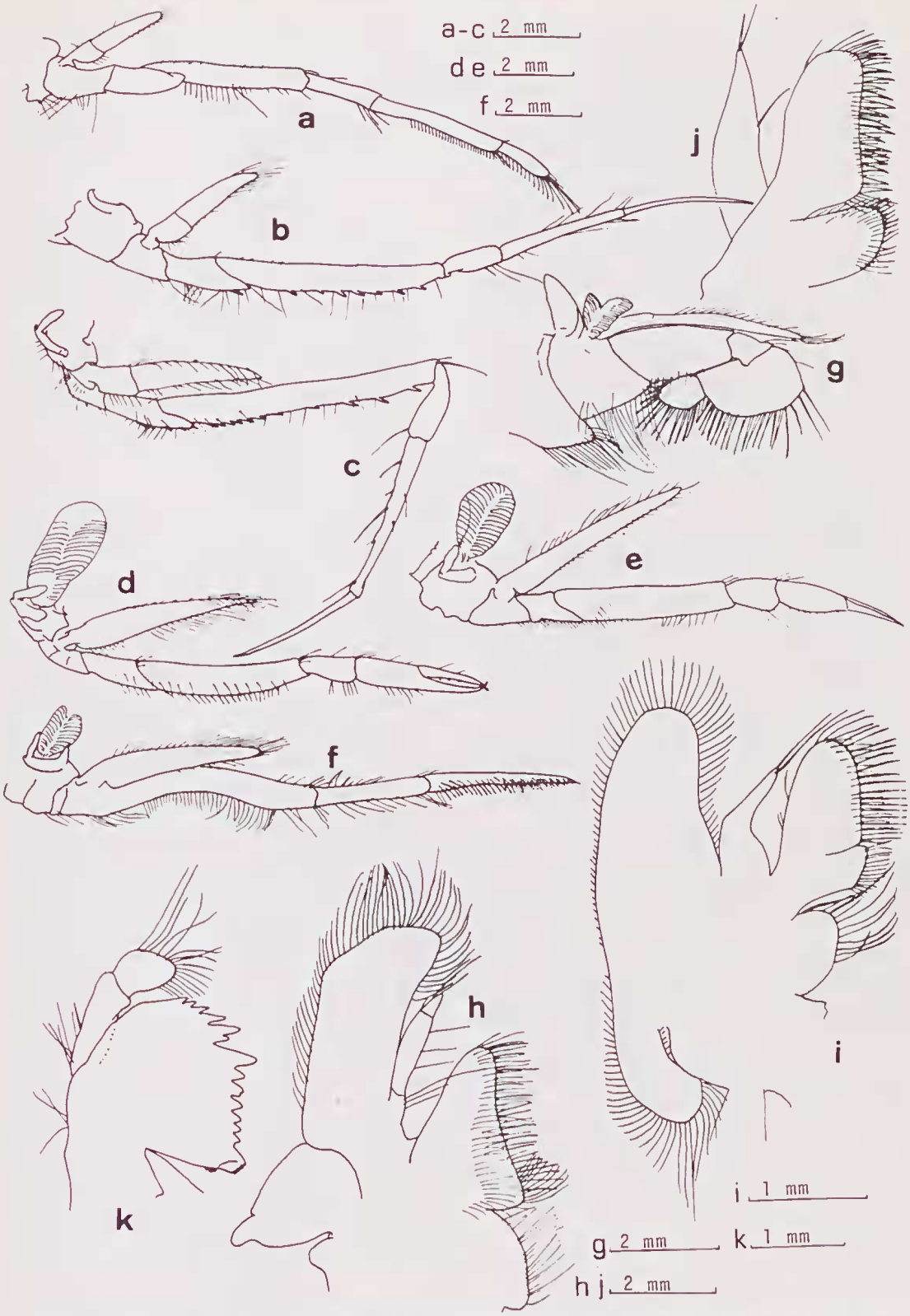

Fig. 11. *Janicella spinicauda* ♂ cl 11.3 mm: **a**, 5th pereiopod, right; **b**, 4th pereiopod, right; **c**, 3rd pereiopod, right; **d**, 2nd pereiopod, right; **e**, 1st pereiopod, right; **f**, 3rd maxilliped, right; **g**, 2nd maxilliped, right; **h**, 1st maxilliped, right; **i**, 2nd maxilla, right; **j**, 1st maxilla, right; **k**, mandible, right.

Remarks. The currently accepted recognition of the species, *O. spinicauda*, has some reason to doubt about the systematic position. As Chace mentioned (1940, 1986), this species shows some resemblance to *Systellaspis*. Certain morphological characters of the species are quite distinct from those of the typical species of *Oplophorus*, such as: 1) the placement of branchiostegal spine, 2) the ventral portion of the carapace not concealing the lower part of the branchial chamber, 3) the sixth abdominal somite being relatively slender, 4) the distal end-piece of the telson armed with lateral spines, 5) the basicerite ventrolateral spine not so long, 6) the mouth parts, 7) the exopods of certain maxillipeds and first perciopod not so rigid, and 8) the form of certain pereiopods.

The shape of the antennal scale, however, shows a fairly close relationship to the species of *Oplophorus*, though the distal margin of the lamella in this species is different from the *Oplophorus* species. The spination on lateral margin of the antennal scale may not be of taxonomic importance for the genus *Oplophorus*, since *O. novaezeelandiae* de Man, 1931, does not possess such spines. The absence of the appendix masculina is a unique feature of this species and as such condition is found in no species of either in *Oplophorus* or in *Systellaspis*. The mouth parts also differ slightly from those of the *Systellaspis* species.

Recently Chace (1986) proposed a new monotypic genus *Janicella* for *O. spinicauda*. His proposal seems to me to have more merit than the early recognition for reasons mentioned above.

Distribution. Hawaiian Islands; Japan; Philippines; eastern Indian Ocean; east of Farquhar; south of India; Southern Africa; coast of Morocco; Bermuda; off Florida; Bahamas; Carribean Sea; Gulf of Mexico. New to northwestern Australian shelf fauna.

Genus *Oplophorus* H. Milne Edwards
Oplophorus gracilirostris A. Milne Edwards
(Fig. 12a-c)

Oplophorus gracilirostris A. Milne Edwards, 1881: 6; -1883, Pl. 30; Alcock 1901: 73; Rathbun 1906: 921; Yokoya 1933: 29, Fig. 12; Chace 1936: 30; -1947: 44, Figs 4-7; -1986: 59, Fig. 32a-e; Bullis and Thompson 1965: 7; Kensley 1972: 38, Fig. 17f; -1981a: 58 (in list); -1981b: 22; Monod 1973: 121, Figs 19,20; Aizawa 1974: 35; Ziemann 1975: 51; Hanamura 1979: 171; Takeda 1983: 54, 1 Fig.

Oplophorus longirostris Bate, 1888: 765, Pl. 127, Fig. 2.

Hoplophorus smithi Wood Mason *in* Wood Mason and Alcock 1891: 194.

Hoplophorus gracilirostris- Faxon 1896: 161; Wood Mason and Alcock 1892: 365; Kemp 1913: 63.

Hoplophorus typus- (not H. Milne Edwards) Balss 1925: 248 (in part); Calman 1939: 188 (in part).

Material. CSIRO 0184-16, 1 ♂, cl 16.5 mm, 31 January 1984, 18°37.4′S, 117°02.4′E, 506 m depth; CSIRO 0184-23, 1 ♂, cl 12.0 mm, 1 February 1984, 18°34.7′S, 117°32.7′E, 357 m depth; CSIRO 0184 NWS-43 T/18, 1 ♂, cl 8.8 mm, 31 January 1984, 18°43.7′S, 117°02.2′E, 454 m depth (NTM Cr. 001166); CSIRO 0184 NWS-44 T/19, 1 juv. cl 6.8 mm, 1 January 1984, 18°46.9′S, 117°06.9′E, 350-354 m depth (NTM Cr. 000698); CSIRO 0184 NWS-46 T/21, 1 ♂, cl 9.0 mm, 1 February 1984, 18°30.1′S, 117°31.3′E, 446-452 m depth (NTM Cr. 000697); CSIRO 0184 NWS-48 T/23, 1 ♂, 8.7 mm, 1 February 1984, 18°34.7′S, 117°32.8′E, 356-358 m

Table 2. Number of telson spines in *Oplophorus* species

Species	*No. of spines*	*Sources*
O. typus	1-2 (in adult)	Bate (1888)
	3 (at least cl 10 mm)	present work
O. gracilirostris	2 (>cl 12 mm)	Monod (1973); present work
	3 (<cl 9 mm)	present work
O. novaezeelandiae	3 (in adult)	de Man (1931); Hayashi and Miyake (1968); Crosnier and Forest (1968, 1973)
O. spinosus	3 (in adult)	Hanamura (unpubl.)

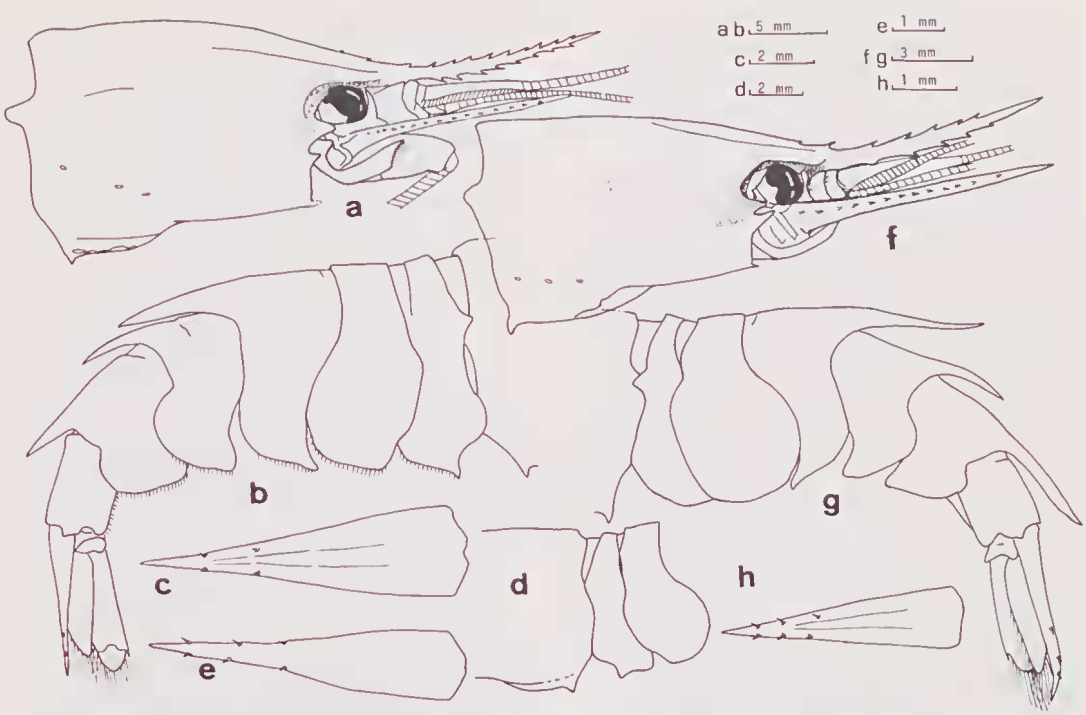

Fig. 12. *Oplophorus gracilirostris:* **a-c**, ♂ cl 16.5 mm: **a**, anterior part of body, lateral; **b**, posterior part of body, lateral; **c**, telson; **d-e**, young cl 6.8 mm: **d**, posterior part of carapace and 1st and 2nd abdominal somites; **e**, telson. *Oplophorus typus* young cl 10.0 mm: **f**, anterior part of body, lateral; **g**, posterior part of body, lateral; **h**, telson.

depth (NTM Cr. 000696); CSIRO 0184 NWS-67 T/44, 1 ♂, cl 17.8 mm, 5 February 1984, 16°18.1′S, 120°18.7′E, 496-500 m depth (NTM Cr. 001185); CSIRO 0184 NWS-68 T/45, 1 ♂, cl 16.0 mm, 5 February 1984, 16°24.0′S, 120°20.4′E, 452-456 m depth (NTM Cr. 000591).

Description. Carapace with paired longitudinal dorsal carinae on anterior portion, parallel to median carina. Branchiostegal spine projecting from anterolateral margin of carapace.

Abdomen terminating in long spine on third to fifth somites. Pleuron of first somite with distinct spine on ventral margin.

Telson with two pairs of dorsolateral spines in larger specimens at least more than 12 mm in carapace length, and three spines at least in those less than 9 mm in carapace length, sharp pointed end-piece without lateral spines.

Antennal scale usually with, rarely without, barb on inner margin near distal portion, bearing series of spines on lateral margin. Basicerite with ventrolateral process extending distinctly anteriorly.

Exopods on second and third maxillipeds and on first pereiopod distinctly rigid.

Remarks. For the identification of this species, I follow Chace (1947) and Hayashi and Miyake (1969).

The telson spines vary in number with increase in body size. But adult *O. gracilirostris* (larger than about 12 mm in cl) has two pairs of spines, whereas *O. spinosus* and *O. novaezeelandiae* have three pairs of spines in the adult size. If this condition has taxonomic importance, it may be desirable to reproduce here the available data (Table 2).

Distribution. Hawaiian Islands; Japan; Philippines; New Caledonia; Fiji Islands; Andaman Sea; Indonesia; eastern part of Indian Ocean; Arabian Sea; Bay of Bengal; Desroches Atoll; Southern Africa; West Indies; Gulf of Mexico; Suriname and French Guiana. Not previously recorded from north-west Australian shelf.

Oplophorus typus H. Milne Edwards
(Fig. 12f-h)

Oplophorus typus H. Milne Edwards, 1837: 424, Pl. 25, Fig. 6: Bate 1888: 762, Pl. 127, Fig. 1; de Man 1920: 48 (in key); Chace 1936: 30; -1947, Figs 8-11; -1986: 60, Figs 32p-t, 33; Hayashi and Miyake 1969a: 71; Aizawa 1974: 37; Kensley 1981a: 58 (in list); -1981b: 22.

Hoplophorus typus-Balss 1925: 248, Figs 21-23 (in part); Calman 1939: 188 (in part).

Material. CSIRO 0184-23, 1 ♀ cl 10.0 mm, 1 February 1984, 18°34.7′S, 117°32.7′E, 357 m depth.

Description. Rostrum about 1.3 times as long as carapace, with six dorsal and five ventral spines. Carapace with paired longitudinal ridges on anterior portion converging posteriorly both in dorsal and lateral aspects. Branchiostegal spine projecting from anterolateral margin of carapace.

Abdomen terminating in long spine on third to fifth somites. Pleuron of first somite nearly smooth, without spine on ventral margin.

Telson about 2.5 times as long as sixth somite, with three pairs of dorsolateral spines, sharp pointed end-piece without lateral spines.

Antennal scale nearly smooth on inner margin near distal portion, with series of spines on lateral margin.

Exopods on second and third maxillipeds and on first pereiopod distinctly rigid.

Remarks. Only one specimen is referred to this species. The number of telson spines in fully mature individuals has not yet been confirmed by myself, but Bate (1888) stated that this species has one or two spines. Thus it is highly probable that the telson spines, as in *O. gracilirostris*, may change with increasing body size.

Distribution. Tropical western Pacific; New Guinea; Philippines; Malay Archipelago; Andaman Sea; eastern Indian Ocean; Maldives; Arabian Sea; Gulf of Aden; Madagascar; Southern Africa. New to north-west Australian shelf.

Family Thalassocarididae
Genus *Thalassocaris* Stimpson
Thalassocaris crinita (Dana)
(Fig. 13)

Regulus crinitus- Dana 1852: 599, Pl. 39, Fig. 6a-h.
Thalassocaris crinitus- Balss 1914: 28
?Thalassocaris affinis Borradaile, 1915: 208 (in part).
Thalassocaris crinita - de Man 1920: 95, Pl. 9, Fig. 22-22o; Kemp 1925: 284; Menon and Williamson 1971: 33, Figs 1b, 3, 5b, 6c, d: Chace 1985: 7, Figs 3-5.
Thalassocaris crinita var.? - de Man 1920: 100, Pl. 10, Fig. 23-23c.

Material. CSIRO 0283, 1 ♂, cl 3.4 mm (definite data unknown).

Description. Rostrum widest at level of front of eyes in dorsal view, with eight stout dorsal and three stout ventral spines. Supraorbital spine well developed. Antennal and branchiostegal spines developed, placed close together.

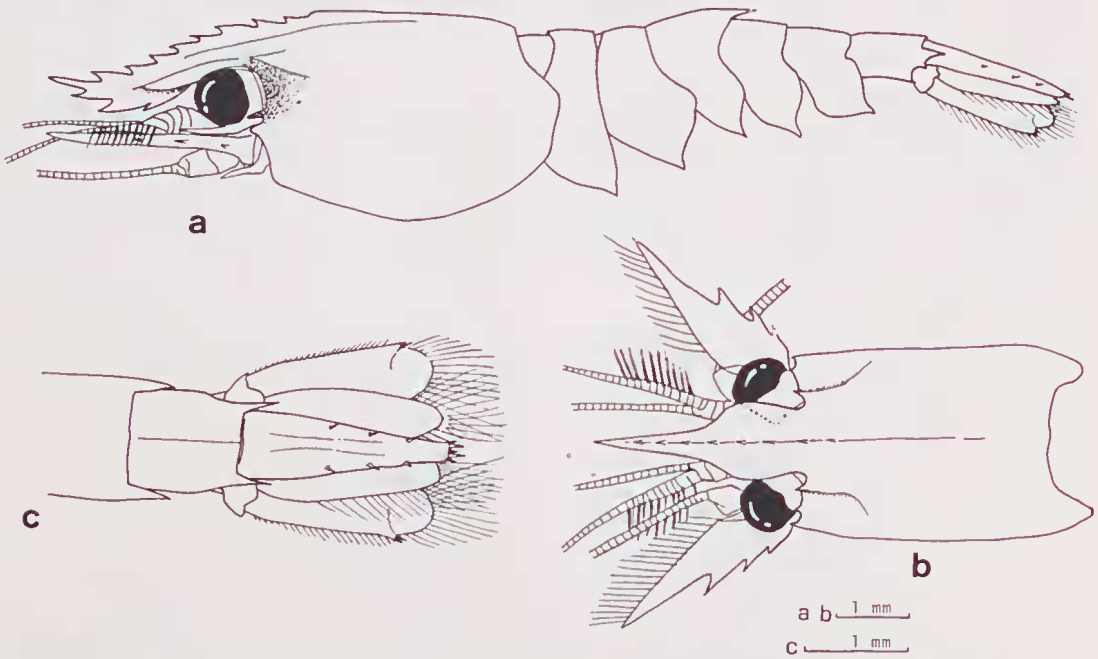

Fig. 13. *Thalassocaris crinita* ♂ cl 3.4 mm: **a**, body, lateral; **b**, anterior part of body, dorsal; **c**, telson.

Abdomen dorsally rounded, third somite ending with large dorsal spine. Pleura of first to fifth somites with acute tooth on ventral margin. Telson nearly twice as long as sixth somite, armed with three pairs of dorsolateral spines and three terminal spines.

Antennal scale shorter than carapace, with three stout lateral spines.

Second pereiopod with distinctly large chela, carpal segment unjointed. First pereiopod without chela.

Distribution. Marshall Island; Japan; Sulu Sea; Philippines; Malay Archipelago; Bay of Bengal; Sri Lanka (Ceylon); northwest India; Arabian Sea; Red Sea; Maldive Islands; Amirante Islands; Seychelle Islands; Cargodos Carajos; west coast of northern Africa; Madagascar. New to the Australian fauna.

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